Section 15

(4)

Report to
Internal Revenue Service
Department of Treasury
September 1987

Evaluation of California Crude Oil Prices for 1980-1983

IRS Contract TIR-SW-86-012

Arthur D. Little, Inc. Reference 56599

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

I. INTRODUCTION

The IRS has asked Arthur D. Little, Inc. (ADL) to comment on California crude oil posted prices for the period 1980 through 1983 with a view toward rendering a judgment as to whether or not these prices are the proper basis for determining Windfall Profit Tax liabilities. The issue of California crude oil prices was reviewed by ADL in the context of establishing a proper basis for Windfall Profit Taxes on Alaskan crude oils and, in particular, to address Arco's position that if its Gulf Coast netback methodology for determining Alaskan North Slope (ANS) crude values was not acceptable to the IRS, it would argue for a West Coast ANS value constructed from California crude oil postings. ADL rejected [redacted] position[1], primarily on the grounds that there was a well known and widely publicized West Coast ANS market price at which [redacted] sold substantial volumes to arms length West Coast buyers. Thus, there is no need to go to a constructed value based on California crudes when an ANS price for the market in question can be determined by direct observation. In the course of analyzing [redacted]s position, however, ADL did investigate California crude oil prices and this report draws from that analysis.

II. CONCLUSIONS

It is ADL's opinion that California posted prices are a proper basis for the calculation of taxes and royalties. A substantial volume of California crude oil comprising at least a third of production, and generally more, was sold between unrelated parties at these posted prices. Thus, although these posted prices should not be used, as Arco has contended, to construct a West Coast price for ANS for which there was a well-known and widely publicized price, we believe they are valid prices for California crude oils.

---

(1) In the May 15, 1987 Discussion Notes, "Assessment of IRS Position Versus [redacted] - Windfall Profits Tax, 1980-1983"

Posted prices for California crudes, which appear low in relation to other U.S. crude postings, are a reflection of a market structure in which refiners were able to capture economic rent from their proprietary pipeline operations because marginal buyers and sellers were forced to use high cost alternate transportation. Thus, the refiners' control over gathering and pipeline transportation in effect creates a less competitive market in California than is the case elsewhere in the country where access to transport is facilitated by the common carrier status of the pipeline systems. The California situation is also exacerbated by the preponderance of heavy crude oil production which, on the one hand, requires that refiners have an inducement to install costly upgrading facilities and, on the other hand, creates an interest among independent producers to sign long term contracts linked to posted prices to insure outlets. Low heavy crude oil prices, in turn, tend to drag down the prices of lighter crude oils even though California gravity differentials (price versus API gravity) are the highest in the country. As a result, during the 1980 to 1983 period, California refiners were able to purchase local crude oils at prices in the field below those which would have been determined by their value at refineries (less common carrier pipeline charges) as set by marginal crude oil supplies to the West Coast market, i.e., ANS or imports.

We, therefore, conclude that posted prices are a proper basis to calculate windfall profit tax liabilities in California except where it can be shown that a company gained a price benefit by exchanging its California crude oil production (or a portion thereof) for crude oils outside the West Coast market. This may have been the case for some PAD V crude oil producers which have refineries in other parts of the country.

III. BACKGROUND

A. The International Crude Oil Market - 1980 through 1983

The onset of the Iranian revolution in late 1978 led to rapid increases in spot market crude oil prices which, in turn, triggered off increases in the official selling prices (OSP's) at which governments sold crude oil to term buyers and/or on which the tax and royalty payments due from their concessionaires were based. In 1979, the difference between spot and contract prices, in some cases, approached as much as $20/barrel. At the start of 1980, the spot-contract differential for Arab Light was over $10/barrel but this narrowed during 1980 as the Saudi's increased their contract prices and spot prices fell. Following the Iraq invasion of Iran in September 1980 spot prices again jumped opening a gap between spot and contract prices of the order of $8/barrel. By mid-1981, Arab Light spot and contract prices were realigned but in 1982 spot prices fell below contract levels and this continued throughout 1983. These price trends are portrayed in Figure 1.

During this period, the international crude oil market which had been dominated by term contracts became increasingly spot market oriented. This complicates any analysis of crude oil transfer prices since a judgment must be made as to whether to attribute a spot or contract price to the transaction being investigated. Furthermore, during this period, the OSP's of individual crude oils were not in market equilibrium as some countries moved their OSP's towards spot levels faster than others. The differences in pricing policy adopted by a number of Middle East oil producers are revealed in Figure 2. At the end of 1978, the prices of all the crudes shown in Figure 2 (which are similar in quality and location) differed by 11¢/barrel or less. Following the Iranian revolution, Egypt increased its prices rapidly toward spot market levels. Iran also priced aggressively raising its prices towards spot market levels well in advance of the other Middle East producers. Kuwait (along with Iraq and Abu Dhabi) was more

Arthur D. Little, Inc.

Figure 1

ARAB LIGHT SPOT VERSUS CONTRACT CRUDE PRICE

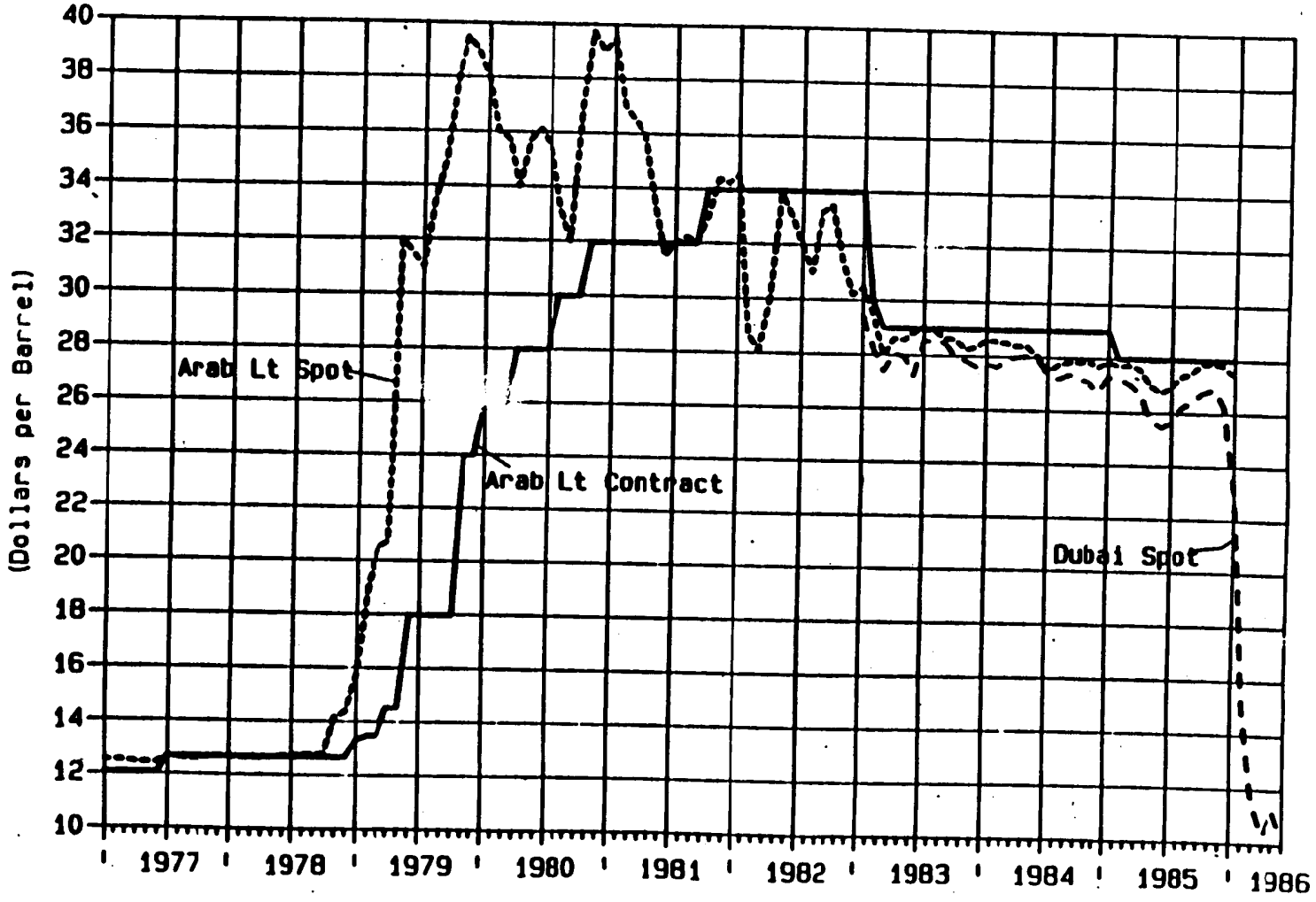
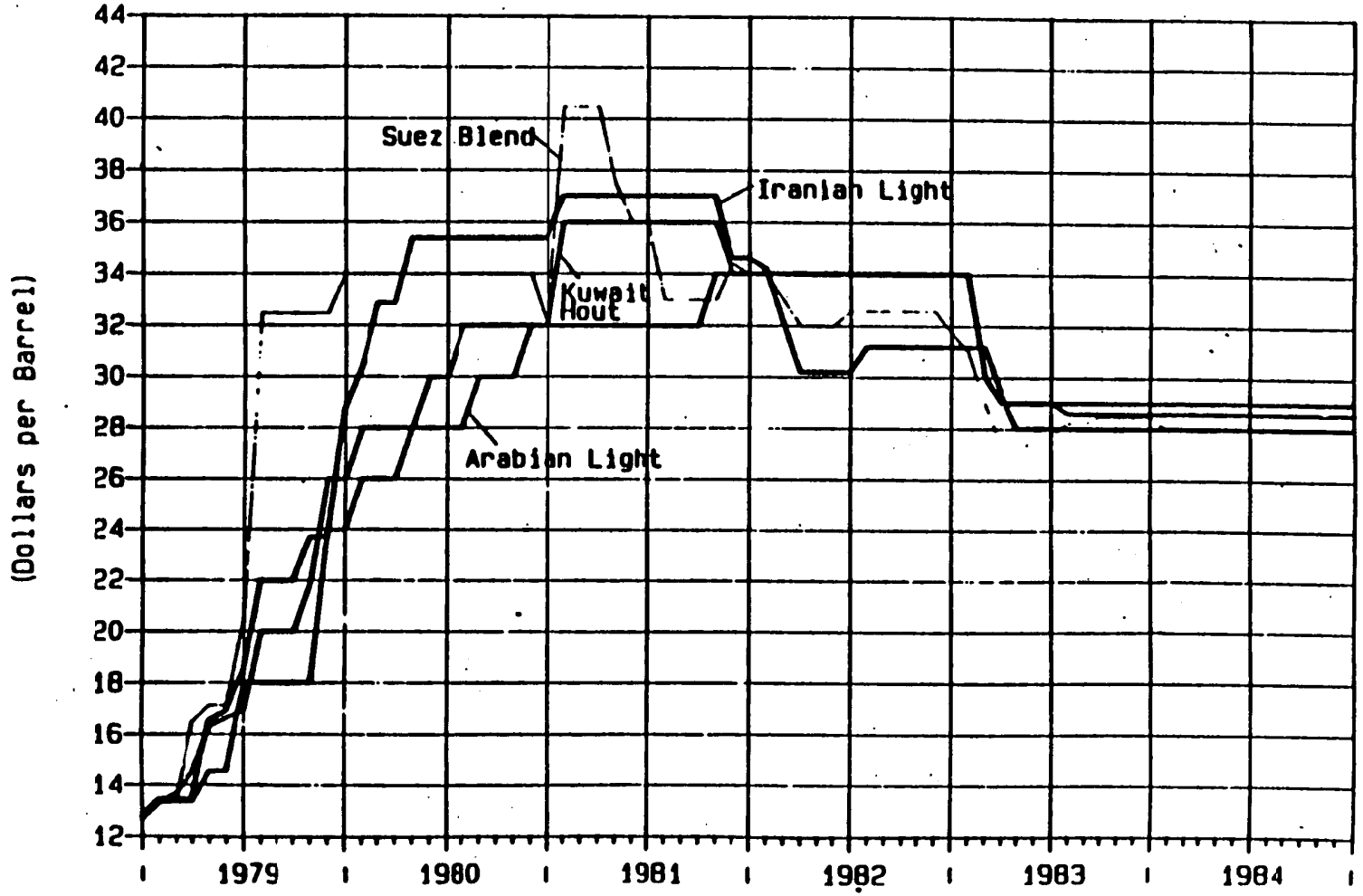


Figure 2

PRICING POLICY DIFFERENCES AMONG SELECTED PRODUCING COUNTRIES



conservative than Iran and Egypt but increased its prices more rapidly than Saudi Arabia. Saudi Arabia, which was seeking to restrain overall price increases, established prices through 1980 which were $2/barrel less, and through the first three-quarters of 1981 were $4/barrel less than those of Kuwait and the other conservative OPEC producers. This was the period of the OPEC "deemed marker" and the so-called ARAMCO advantage. In the fourth quarter of 1981, the Saudi Light price was increased to $34/barrel and price equilibrium amongst Mid-East crudes was temporarily restored. Weak spot markets in 1982, continuing throughout 1983, caused reductions in the OSP's of Iranian and Egyptian crudes in early 1982 and again in early 1983. Saudi crude prices were not reduced until February and March of 1983 and then not to market levels. Thus, the ARAMCO advantage turned to a disadvantage in early 1982 continuing throughout 1983.

In summary, the international crude market was in a state of disequilibrium throughout the time period (1980-1983) during which judgments on the market values of Alaskan and California crude oils are required. International spot crude oil prices were higher than contract prices (OSP's) during 1980 and most of 1981 and lower than contract prices in 1982 and 1983. Furthermore, even the contract prices of individual international crude oils of similar quality were not in equilibrium as some countries sought to align their contract prices to spot market levels quickly while others set prices which lagged the spot market considerably. These turbulent market conditions during the period of interest make it difficult to establish a reference crude which can be used as the benchmark to determine the value of other crude oils based on quality and locational differences. This set of circumstances places special importance on obtaining third party market transaction data for individual crude oils as the most reliable way of judging prices.

B. <u>The Domestic Crude Oil Market - 1980 through 1983</u>

The U.S. domestic crude oil market during 1980 through 1983 experienced similar turmoil to that which characterized the international

crude oil market. Analysis of this market during 1980 is further complicated by the price control regulations which applied to different categories of production depending primarily on when the crude oil production was first established. Starting on January 1, 1980, phased price decontrol was introduced with the objective of achieving full price decontrol over a period of 22 months (California heavy crude oils had been decontrolled earlier--August 17, 1979 for 16° API or less and December 21, 1979 for 16-20° API crudes). Phased decontrol was accompanied by the Windfall Profit Tax which became effective on March 1, 1980. Special provisions were introduced for Alaskan North Slope crude oil, the price of which in July 1979 had become limited by its upper tier ceiling. This created a situation in which upper tier ANS, which received a full foreign crude oil entitlement credit but had to be sold at a lower price than foreign crude, became substantially cheaper than foreign crude oils. A "reverse" entitlement credit was introduced for upper tier ANS retroactive to May 1, 1980 in an effort to correct this situation. Finally, on January 28, 1981, domestic crude oil prices were deregulated and free market conditions were restored after nearly 10 years of control.

The U.S. price control and entitlements program adds another dimension to the already complex crude oil market environment. The overall intent of the entitlement program was to equalize the crude costs of comparable value crude oils. The program, however, failed to do this even for identical crude oils. Table 1 shows the entitlement adjusted cost to refiners of lower tier, upper tier and decontrolled Long Beach 26° API California crude oil in January 1980 and December 1980. The table shows that the cost to refiners of lower tier crude oil was of the order of $1/barrel more than upper tier and about $3/barrel more than decontrolled in January 1980 rising to almost $7/barrel in December 1980. During this period, purchasers of California crude oils may have been setting the decontrolled price to achieve a market oriented composite price. [redacted] and [redacted] for example, stated they were setting the decontrolled ANS price to achieve a market oriented composite during this period.

TABLE 1

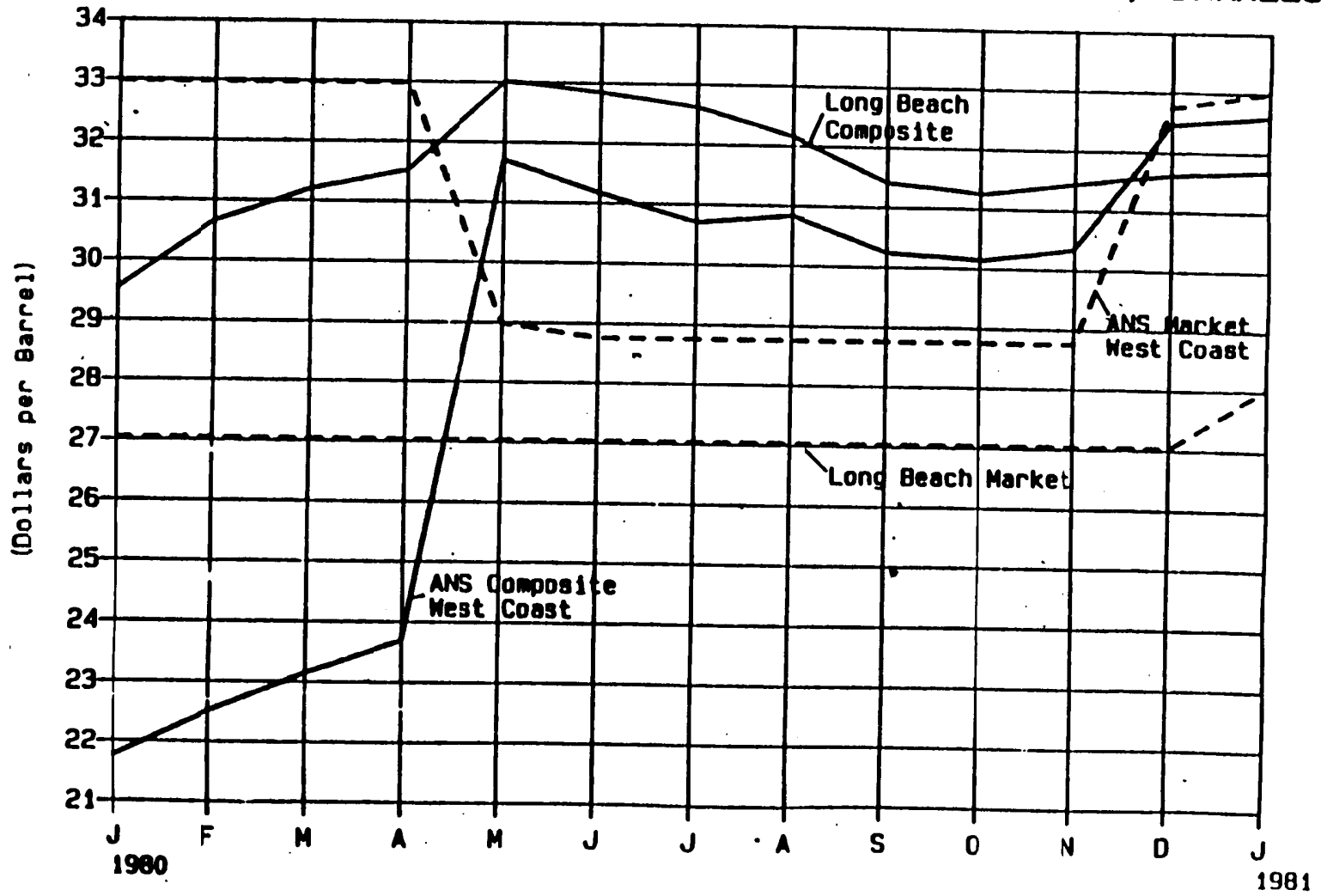
ENTITLEMENT ADJUSTED POSTED PRICES
FOR LONG BEACH 26° API CRUDE OIL
($/B)

	8001			8212		
	Price	Entitlement Adjustment	Total Cost	Price	Entitlement Adjustment	Total Cost
Lower Tier	6.20	18.25	24.45	6.75	25.53	32.28
Upper Tier	12.72	10.71	23.43	13.93	17.52	31.45
Decontrolled	26.95	(5.28)	21.69	26.95	(1.53)	25.42

Figure 3 contrasts the cost to refiners of purchasing decontrolled Long Beach (27°API) crude oil and ANS at the [redacted] West Coast contract price versus a composite barrel of the same crudes at the statutory percentages of lower tier, upper tier and decontrolled. For ANS prior to May 1980 when "reverse" entitlements were introduced, the ANS composite cost was substantially less than the decontrolled price since no entitlement penalty applied to ANS upper tier as was the case for all other upper tier crudes. In May, following the introduction of reverse entitlements, [redacted] dropped its decontrolled price by $4/barrel to achieve a market oriented composite price. In the post May period until December, the composite cost of ANS to refiners was typically $1.50 to $2.00 per barrel higher than the decontrolled price. For Long Beach, the situation was even more extreme. The cost of a composite barrel was $2.50 per barrel more than a decontrolled barrel on January 1980, rising to $6 per barrel more in May before declining to $4.50 per barrel in September. Furthermore, until December 1980, a composite barrel of Long Beach crude cost more than a composite barrel of ANS even though a barrel of decontrolled Long Beach crude oil cost less. From May 1980, composite Long Beach was $1 to $2 per barrel more than composite ANS while decontrolled Long Beach was $2 per barrel less than decontrolled ANS. These price discrepancies caused by the inherent inflexibility of the regulatory system to accommodate to rapidly changing open market conditions, clearly make 1980 an extremely difficult year for which to determine prices.

Figure 3

CRUDE COSTS TO REFINERS (BEFORE RUN CREDIT) OF DECONTROLLED AND COMPOSITE (LOWER TIER, UPPER TIER, AND DECONTROLLED) BARRELS

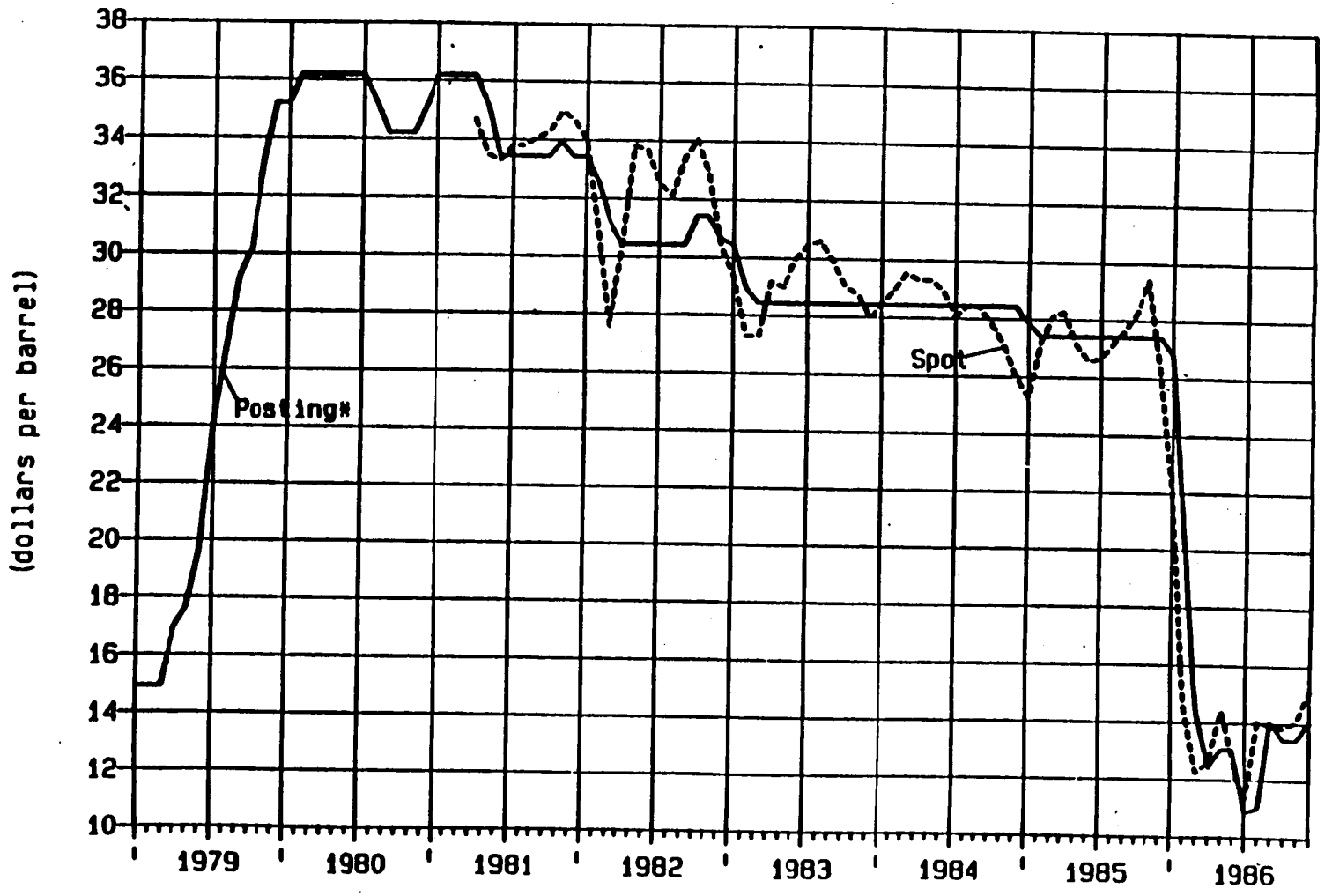


Following decontrol in January 1981, a spot domestic crude oil market developed in the Gulf Coast/Mid-continent region. Figure 4 shows West Texas Sour spot and posted prices (a nominal 35¢/barrel for gathering and transportation has been added to posted prices to put them on a Midland basis). Spot price weakness caused a reduction in posted prices during the second quarter of 1981. In the second half of 1981, spot prices strengthened and on average were above postings by approximately 70¢/barrel. Spot prices plunged again in the first quarter of 1982 falling to as much as $4/barrel below postings triggering off further reductions in posted prices. Spot prices recovered again in the second quarter of 1982 and, on average, remained $2 per barrel higher than postings until December when they fell below postings causing further posted price reductions in the first quarter of 1983. Spot prices then recovered in the second quarter and remained above postings throughout most of the balance of the year. A similar price pattern (and, in fact, larger differentials between spot and contract prices) applied to the more widely traded West Texas Intermediate sweet crudes.

In summary, during the period of interest (1980-1983) the U.S. crude oil market was in a state of transition with the U.S. spot market, like its international counterpart, becoming more influential. From time to time, substantial differences reaching $4/barrel opened up between spot and contract prices for identical crude oils. Throughout this period, however, we believe that the preponderance of U.S. crude oil was sold at posted prices at the first purchaser level. Subsequent upstream price gains or losses were a consequence of trading and/or transportation activities. As in the case of foreign crude oils the disequilibrium between prices of similar crudes, the emergence of spot market trading, and for the U.S. during 1980, the distortions introduced by price regulations substantially complicates the problem of assessing crude values based on constructive methodologies. To the extent, practicable, therefore, primary emphasis should be placed on third party transaction data for the establishment of crude oil prices.

Figure 4

WEST TEXAS SOUR CRUDE OIL PRICES 1979-1986



*Posted price plus $0.35/barrel for gathering and transportation.

IV. THE CALIFORNIA CRUDE MARKET

A. California Crude Oil Prices

With the start-up of Alaskan North Slope crude oil production, PAD V became a net exporter of crude oil to other parts of the United States. Imported crude oils, previously a significant component of California crude runs, were largely backed out of California except for the Indonesian crude oils needed to meet the low-sulphur specifications of fuel oil used by the utilities. As shown in Table 2 during 1981 through 1983, 90 percent or more of California refinery runs were of domestic origin, predominantly California and Alaskan North Slope crude oils. Rising California production (principally heavy crudes) and falling refinery runs, however, increased the market share of California crudes between 1981 and 1983, largely at the expense of ANS. Given this California crude oil supply/demand situation, one would expect that ANS would have been priced somewhat below similar imported crude oils to insure they were backed out while local California crude oils would have been priced somewhat under ANS to insure their full production.

As shown in Figure 5, such a pricing pattern developed on the U.S. Gulf Coast. Spot foreign crude oil (here represented as Arab Light) set the spot price level of West Texas Sour, which in turn, as described earlier, strongly influenced West Texas Sour posted prices. Alaskan North Slope crude oil, as represented by [redacted]s contract price, followed a price pattern similar to, although on average below, West Texas Sour postings. [redacted]'s Gulf Coast ANS sales, however, involved related exchanges. When these are taken into consideration, the effective price received by [redacted] was higher than the contract price. The IRS, in fact, was able to achieve a settlement with [redacted] based on West Texas Sour postings on which both [redacted] and [redacted] had based their Gulf Coast transfer prices. Overall, the pattern of Gulf Coast crude prices conformed to what would have been expected.

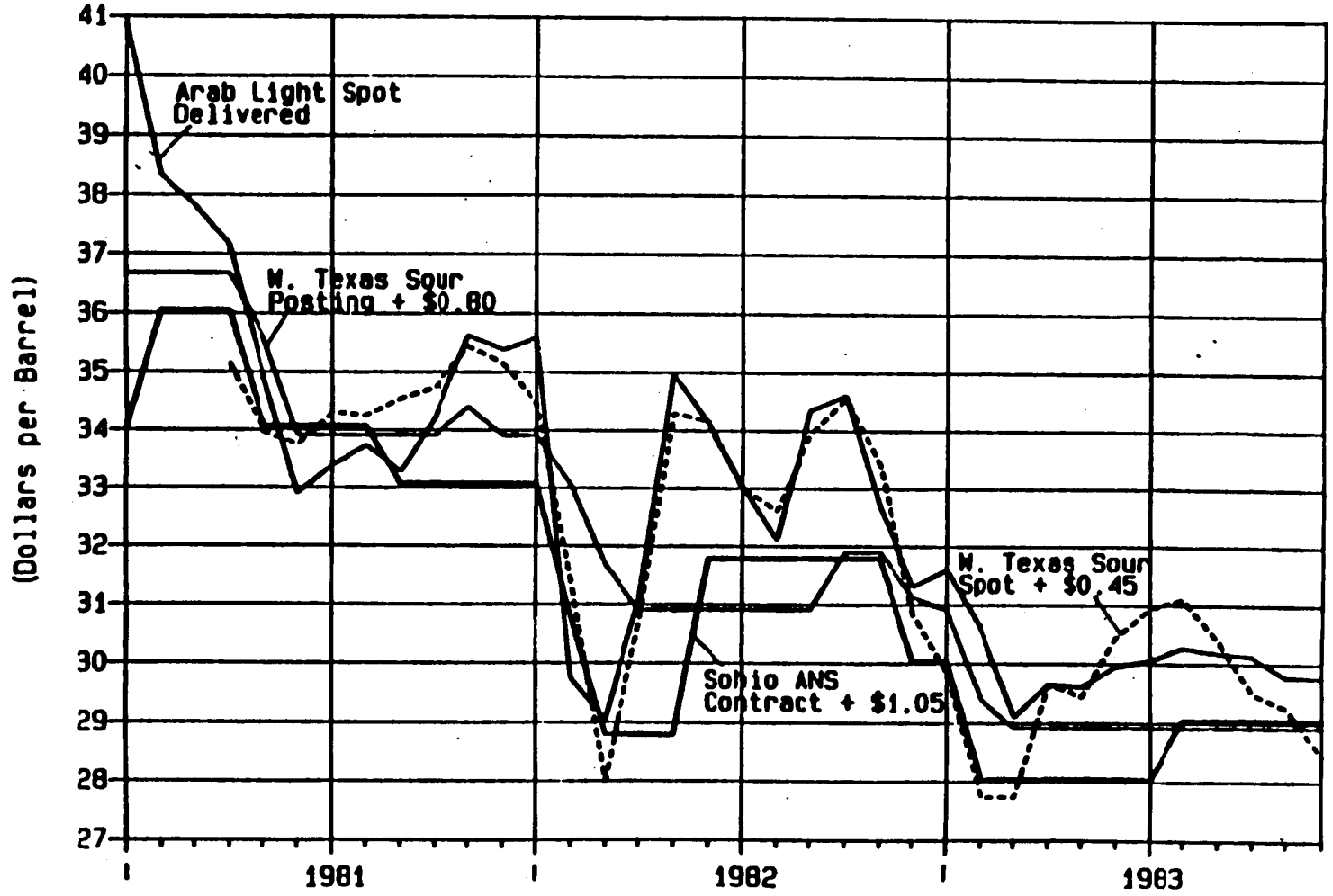
TABLE 2

SOURCES OF CRUDE OIL RECEIPTS AT CALIFORNIA REFINERIES
(Percent)

SOURCE	YEAR		
	1981	1982	1983
California*	51.5	59.2	60.3
Alaska North Slope	36.2	33.0	30.0
Other Alaska	2.4	1.9	1.8
Other States	0.3	0.3	0.2
Total Domestic	90.5	94.4	92.3
Indonesia	8.6	5.1	6.9
Other Foreign	0.9	0.6	0.9
Total Foreign	9.5	5.7	7.8
GRAND TOTAL	100.0	100.0	100.0
Refinery Receipts (MBPD)	634.0	577.7	606.6

*Includes Federal Offshore

Figure 5
U.S. GULF COAST CRUDE OIL PRICE RELATIONSHIPS
ADJUSTED TO 34 ° API



Also, as was to be expected, [redacted]'s West Coast ANS contract price was set below spot Arab Light on a quality-adjusted basis (based on the West Coast gravity differential of 20¢ per degree API) to provide an incentive to refine relatively heavy ANS crude in a market characterized by increasing availabilities of California extra heavy crude oils. However, in sharp contrast to the Gulf Coast, where posted prices of local crudes were above ANS on a quality-adjusted basis, California posted prices remained substantially below ANS prices by about $6/barrel in early 1981, falling to $4/barrel in mid-1981 and $2-3/barrel thereafter. These trends are shown in Figure 6.

The contrast between the prices of comparable West Coast and Gulf Coast crude oils is shown in Figure 7. In the early part of 1981, the West Texas Sour posting was approximately $6/barrel higher than the Kettleman Hills posting for the same gravity crude oil. This differential declined to a little less than $4/barrel in mid-1981, before dropping to approximately $2.50/barrel through most of 1982 and 1983. Given that imported crude oils cost about the same on the Gulf Coast and West Coast and that Sohio's contract prices on the Gulf Coast and West Coast never differed by more than $1.25/barrel (and for much of the period were only 25¢/barrel[1]), one would not expect such large differentials between Gulf Coast and West Coast posted prices of similar crude oils.

Further evidence of the distortions in the California crude market is provided by the prices the Government received when auctioning Elk Hills crude oil. Unlike most California crudes, Elk Hills crude oil is gathered and has access to common carrier pipeline transportation

---

(1)

February 1981	$0.25	June 1982	$1.25
September 1981	1.25	December 1982	0.50
February 1982	0.25	August 1983	1.00

Figure 6
LOS ANGELES CRUDE OIL PRICE RELATIONSHIPS
ADJUSTED TO 34 ° API

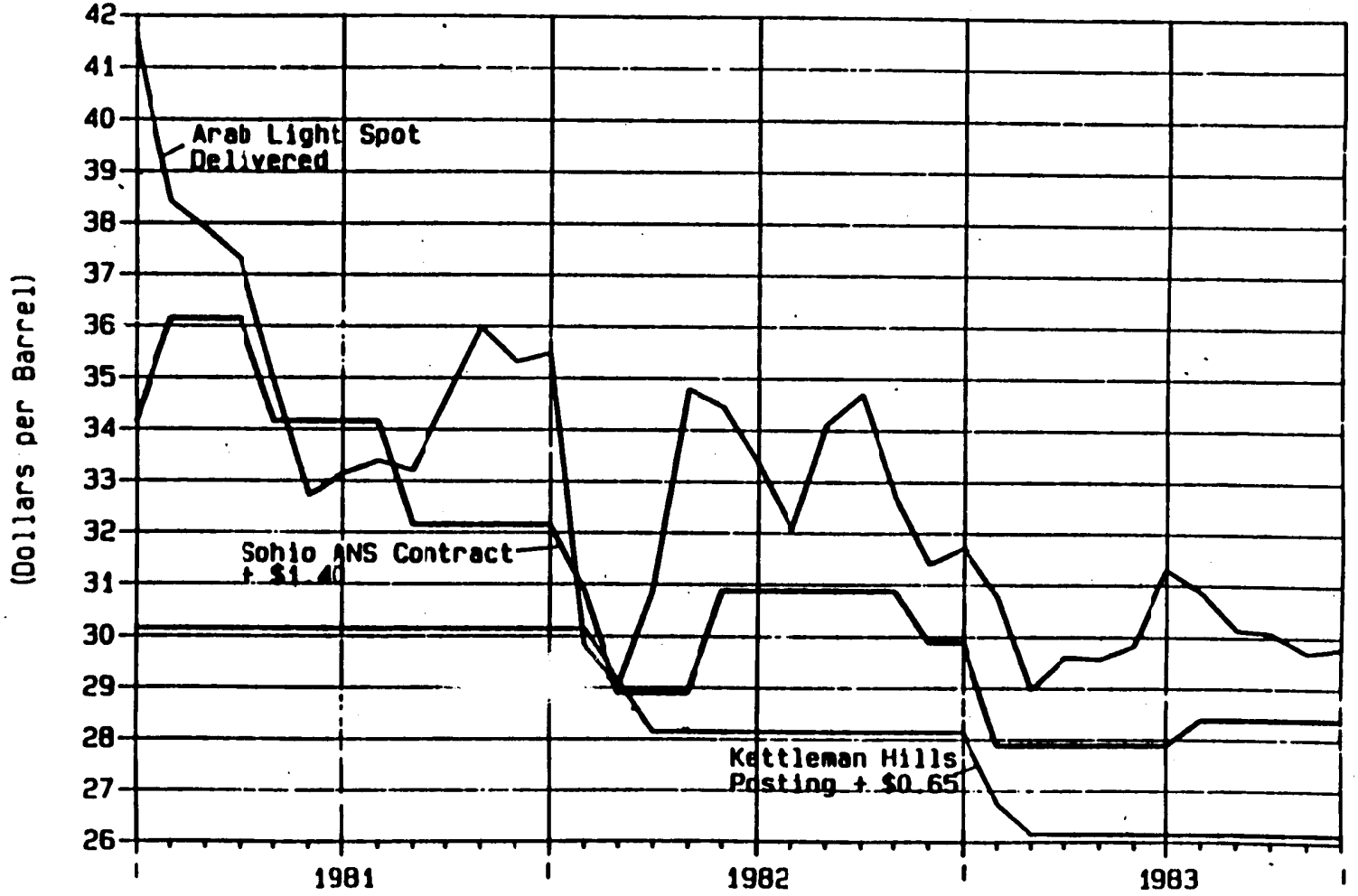
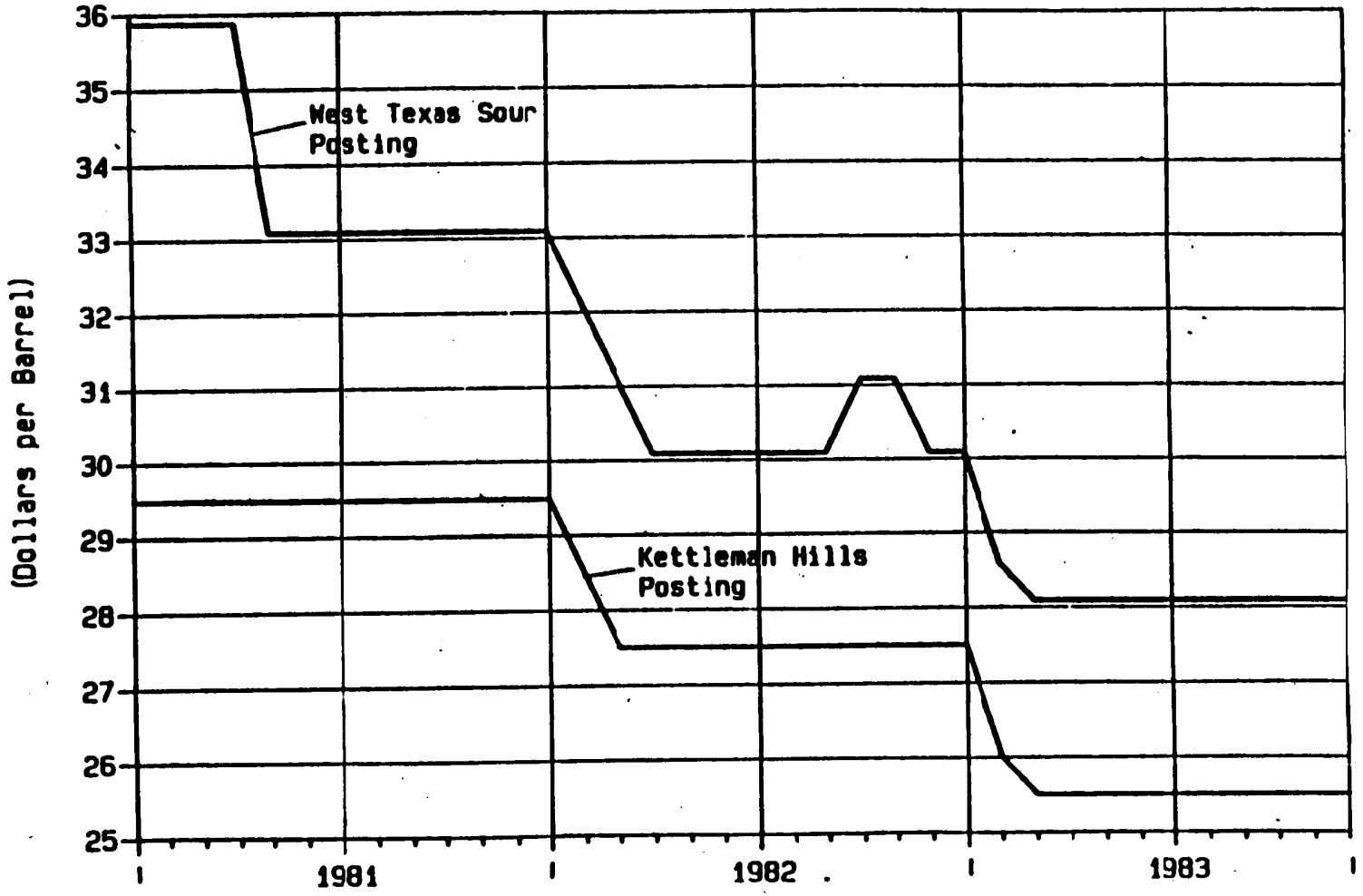


Figure 7

COMPARISON OF U.S. WEST AND GULF COAST POSTED PRICES FOR 34 ° API CRUDES

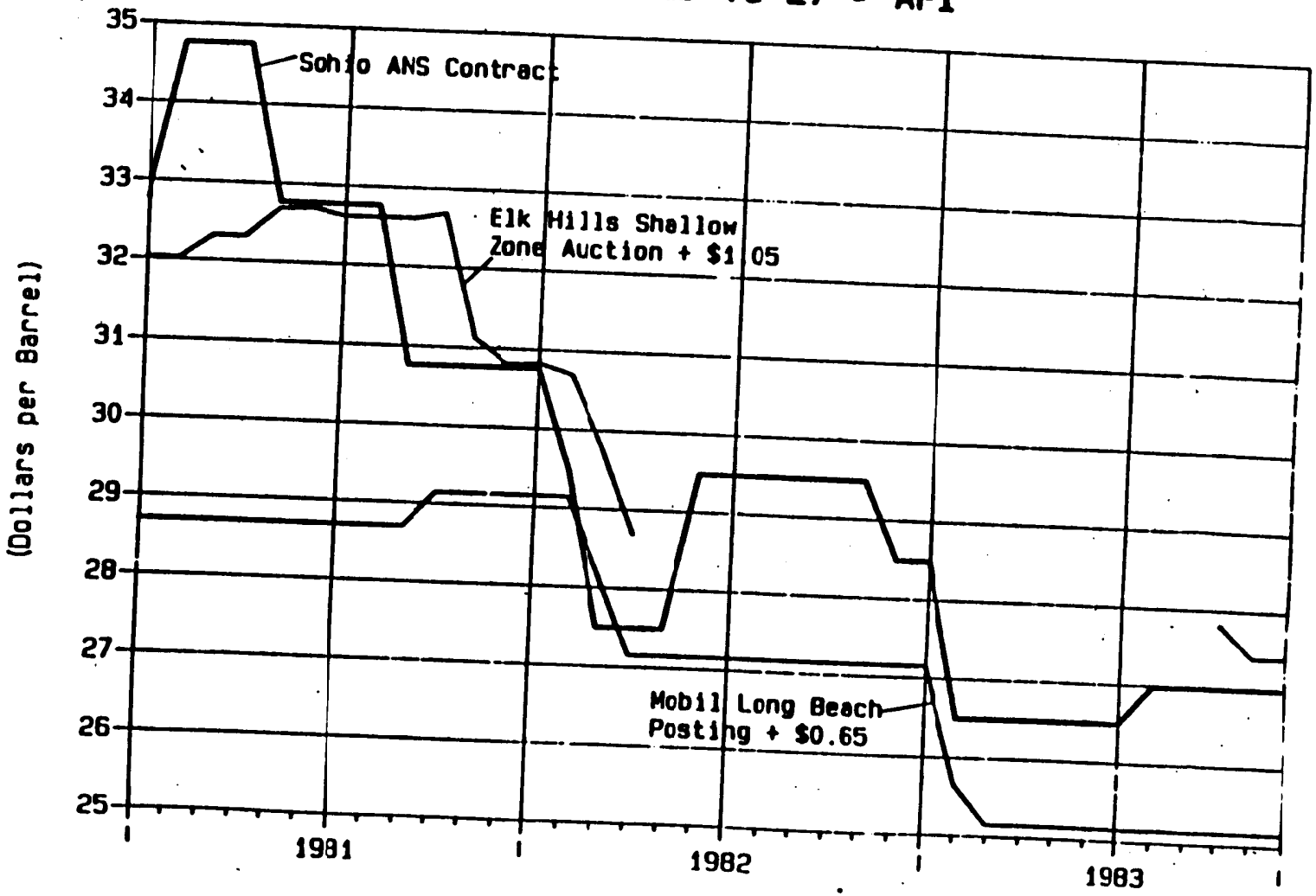


on the Four Corners Pipeline system. Companies were obliged to bid a premium (or a penalty) over California postings to be eligible to receive awards. Bidding companies were exposed to considerable price risk given that the premium they bid was firm for 6 months. As shown in Figure 8, Elk Hills auction prices of shallow zone 25° API crude were comparable to (although lagging) [redacted] ANS contract prices when adjusted for quality and location (20¢ per degree API for quality and 65¢ for transportation). Unfortunately, a direct comparison is not possible for part of 1981, all of 1982 and most of 1983 since, during this period, the auction system was discontinued and Elk Hills crude oil was sold at posted prices in exchange for crude oils delivered to the strategic petroleum reserve. During this period also, the California spot crude oil market was not highly developed and only fragmentary information on spot prices is available against which to judge the level of California crude postings. Nevertheless, the Elk Hills auction, during the period when it was in force, provides additional confirmation that California crude oil postings were below what would be expected under normal market circumstances.

In judging the proper level of West Coast ANS prices it was ADL's view, contrary to that of Arco, that the posted prices of California crude oils during this period were an inappropriate measure because of these discrepancies. California postings were below what they would have been in a more competitive crude market (such as the U.S. Gulf Coast), primarily because of the strong logistical control (trunkline and gathering) exercised by the principal purchasers. Independent producers and/or buyers would have had to resort to costly rail or truck transportation to circumvent the proprietary pipeline and gathering systems of the buyers. In effect, ADL contended that through their control over low cost transportation major oil companies were able to capture the economic rent represented by the difference in the value of California crude oils measured by such marginal crude oils as ANS or imports and the cost of those California crudes acquired at posted prices. The question remains, however, whether

Figure 8

LOS ANGELES CRUDE OIL PRICE RELATIONSHIPS
ADJUSTED TO 27 0 API



California crude oil postings are a valid basis for determining windfall profit taxes for those crudes. This issue is discussed next, through an analysis of the characteristics of the California crude market.

B. Characteristics of the California Crude Market

Various explanations have been offered as to why California crude postings are lower than what would be expected based on marginal crude sources (imports and ANS). In ADL's opinion, the answer lies in the structure and character of the California market which provides an environment in which such a crude oil pricing pattern can exist. Among the most important features of the California market are:

- Strong control over logistics exercised by the PAD V majors which limits access by other refiners and independent producers to low cost gathering and pipeline transportation.

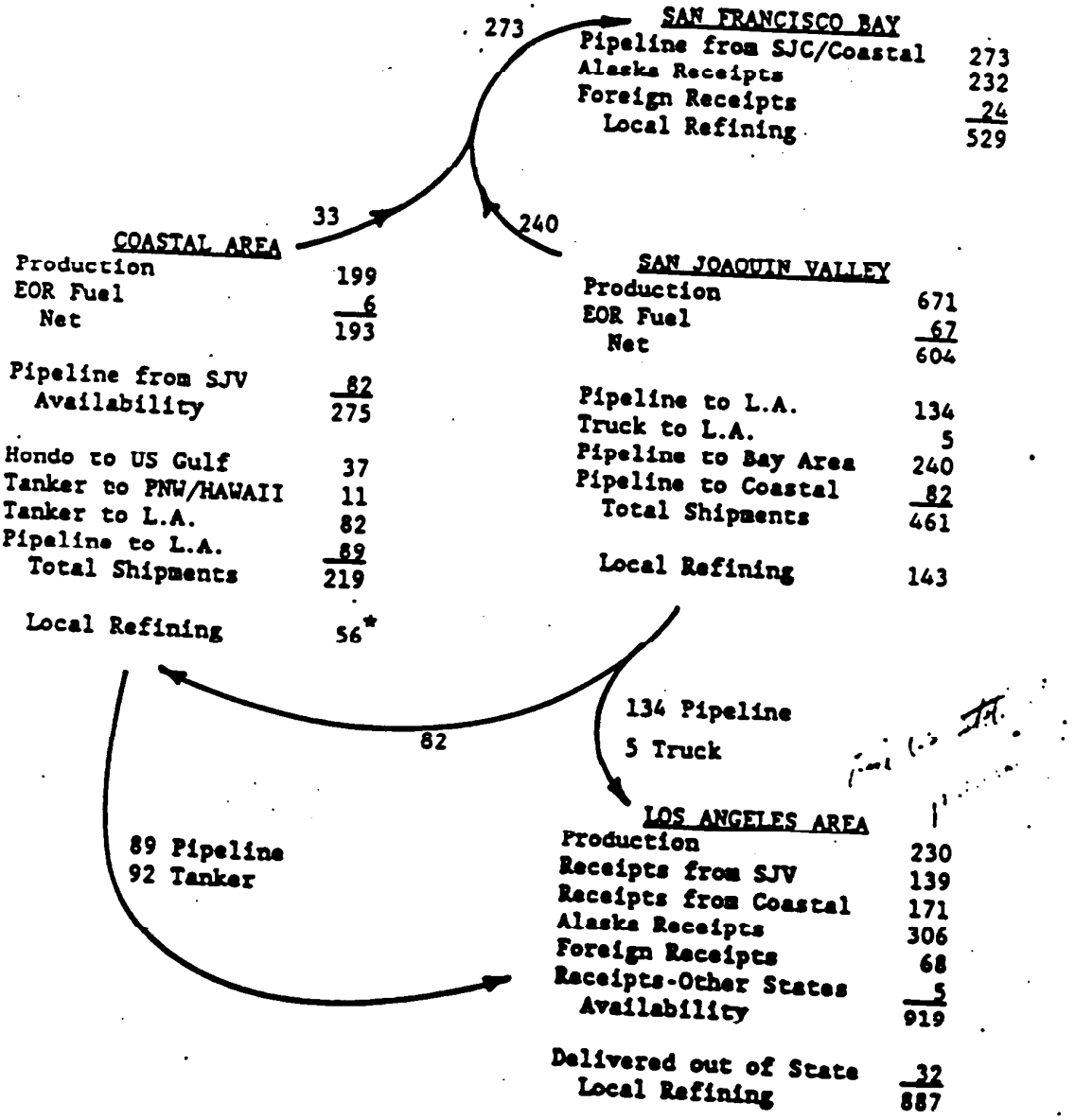
- A tendency toward a heavy crude oil surplus which puts heavy crude prices under pressure which, in turn, tends to depress the overall crude oil price structure.

- A geographically isolated market which confines outlets for local crude oils largely to California refiners and which limits petroleum product movements between California and other U.S. and foreign markets.

Figure 9 shows the estimated 1982 California crude oil supply/demand balance and the linkages among the three primary crude oil supply areas and the three principal refining centers. The San Joaquin Valley is the largest producing area accounting for about 60 percent of total California production. Production in this area has been increasing with the expansion of heavy oil production through steam injection and with the opening up of the Elk Hills petroleum reserve

FIGURE 9

ESTIMATED 1982 CALIFORNIA CRUDE SUPPLY BALANCE
(MBPD)



* Includes Union, Arroyo Grande 33 MBPD Delivered to San Francisco as Unfinished Products

in July 1976. The Los Angeles Area is the second largest California producing area which, after steady declines, had stabilized by 1980 at about 230 MBPD. Production in the Coastal Area, after declining during the 1970's, showed increases in the early 1980's as offshore Federal OCS production was brought on-stream. This area is destined for future substantial increases when the new OCS discoveries in the Santa Barbara Channel are developed.

About 10 percent of the production in the San Joaquin Valley in 1982 was used locally as fuel for steam generation for enhanced oil recovery (EOR) and another 21 percent was run in local refineries. The remainder was shipped to the Los Angeles and San Francisco refining centers mostly by direct pipeline but also by pipeline to coastal terminals (Estero Bay) for shipment by tanker. A small amount was delivered by truck to Los Angeles. In more recent years because of pipeline constraints, Shell has been shipping substantial quantities of 13° API heavy crude (about 40 MBPD in 1986) to its Los Angeles refinery by unit train. Production from the Coastal Area is delivered by tanker and pipeline primarily to Los Angeles although Union delivers unfinished products, derived from coking Santa Maria crude at Arroyo Grande, to San Francisco. Small amounts of crude are delivered from Coastal Area terminals to Hawaii and the Pacific Northwest and Exxon ships most of its low quality Hondo crude to the U.S. Gulf Coast. Crude production in the Los Angeles Area is used by local refineries although some crude oil is shipped out of the area by the Four Corners Pipeline system to U.S. Gulf Coast destinations.

As shown in Table 3, the Los Angeles area accounts for about 57 percent of total California refining capacity followed by the San Francisco Bay area with about 33 percent. The remaining 10 percent of capacity is in the Central area (primarily the San Joaquin Valley). Capacity in the Los Angeles and San Francisco areas is dominated by

TABLE 3

CALIFORNIA REFINERY OWNERSHIP
Refineries Operating on January 1, 1982
(MBPD)

	TOPPING	HYDRO-SKIMMING	COMPLEX	TOTAL	PERCENT
BAY AREA					
Posters	-	-	405.0	405.0	55.6
Shell/Texaco	-	-	91.4	91.4	12.5
PAD V Majors	-	-	496.4	496.4	68.1
Other Large Refiners[1]	-	-	106.0	106.0	14.6
Tosco	-	-	126.0	126.0	17.3
Local Refiners	-	-	-	-	0.0
Total	-	-	728.4	728.4	100.0
Percent	0.0	0.0	100.0		
CENTRAL AREA					
Posters	-	26.0	-	26.0	11.4
Shell/Texaco	-	-	-	-	-
PAD V Majors	-	26.0	-	26.0	11.4
Other Large Refiners[1]	9.5	40.9	-	50.4	22.2
Tosco	-	-	39.5	39.5	17.4
Local Refiners	36.6	74.7	-	111.3	49.0
Total	46.1	141.6	39.5	227.2	100.0
Percent	20.3	62.3	17.4	100.0	
LOS ANGELES AREA					
Posters	-	-	767.0	767.0	60.0
Shell/Texaco	-	-	168.0	168.0	13.1
PAD V Majors	-	-	935.0	935.0	73.1
Other Large Refiners[1]	-	26.3	111.5	137.8	10.8
Tosco	-	-	-	-	-
Local Refiners	119.4	17.6	68.7	205.7	16.1
Total	119.4	43.9	1115.2	1278.5	100.0
Percent	9.4	3.4	87.2	100.0	
STATE TOTAL					
Posters	-	26.0	1172.0	1198.0	53.6
Shell/Texaco	-	-	259.4	259.4	11.6
PAD V Majors	-	26.0	1431.4	1457.4	65.2
Other Large Refiners[1]	9.5	67.2	217.5	294.2	13.2
Tosco	-	-	165.5	165.5	7.4
Local Refiners	156.0	92.3	68.7	317.0	14.2
Total	165.5	185.5	1883.1	2234.1	100.0
Percent	7.4	8.3	84.3	100.0	

[1] Exxon, Getty, Conoco, Champlin, Gulf

the six PAD V majors[1] which control about seventy percent of the total. These companies, however, have only 11 percent of the refinery capacity in the Central area. About 50 percent of the capacity in the Central area is owned by small local refiners with topping or hydroskimming configurations which have little ability to convert residual fuel oil to gasoline or middle distillates. Typically, the refineries in the Central region run at a lower utilization rate than those in San Francisco or Los Angeles (see Table 4). The topping refineries produce primarily fuel oil and asphalt and run a low gravity crude oil (averaging 18.9° in 1984) while the hydroskimming refiners, lacking conversion facilities to convert fuel oil to light products, seek to maximize gasoline yield by running light crude oils (averaging 29.5° API in 1984). Given their simple configuration and small scale of operations, these refineries need favorable crude prices to survive against the sophisticated large-scale refineries of their major oil company competitors. It also follows that independent crude oil producers, looking to integrate forward into refining in order to reduce their dependence on the established majors for crude oil outlets, would also require low crude prices for financial viability. In the end, integration into refining may not improve an independent producer's effective crude oil price realization over selling to the majors at posted prices.

As shown in Table 3, the Bay area refineries are all complex refineries with configurations designed to convert residual fuel oil fractions to high yields of gasoline and middle distillates. In 1982, the only significant independent in operation in this area was Tosco which received a substantial part of its crude oil supply under a long term contract with Getty linked to posted prices. (Getty was the original owner of this refinery.) The other large refiner in the Bay area is Exxon. In the Los Angeles area there are a number of small independents most of which ran local crudes in topping type refineries to

---

[1] Four of the PAD V majors post crude oil prices (Arco, Chevron, Mobil and Union) and two do not (Shell and Texaco).

TABLE 4

CALIFORNIA REFINERY UTILIZATION TRENDS
Percent Utilization of Operating Capacity

	1982	1983	1984	1984 CRUDE QUALITY °API
BY LOCATION				
North	71.2	78.6	82.6	23.2
Central	69.9	68.0	70.6	24.5
South	67.0	71.7	74.6	25.1
Total State	68.7	73.7	77.1	24.3
BY REFINERY TYPE				
Topping	NA	52.1	60.1	18.9
Hydroskimming	NA	72.7	78.7	29.5
Complex	NA	75.6	78.2	24.2
Total State	68.7	73.7	77.1	24.3

produce fuel oil and asphalt. In addition, Champlin, Gulf and Powerine operated conversion type refineries.

Table 5 shows that, as a group, California refiners in 1982 were only 37 percent self-sufficient in California crude oils (assuming capacity operation) and only 30 percent if Getty is eliminated. Getty should really be classified as an independent producer since it was a large net seller of crude oil and its interest lay in higher posted prices. Getty, in fact, withdrew from California refining earlier when it sold its Avon refinery to Phillips which subsequently re-sold the refinery to Tosco. Getty re-entered the California refining market when it acquired Reserve Oil and Gas which was primarily a producing company but which owned the small Mohawk refinery in Bakersfield. It should also be noted that Exxon's California self-sufficiency is overstated in Table 5 since 37 MBPD of its production was Hondo crude oil most of which was delivered to the Gulf Coast. The most integrated company is Shell which benefited from its acquisition of Belridge whose production was subsequently expanded via additional enhanced recovery operations. The four companies which posted California crude prices were on average only 23 percent self-sufficient in California crudes. As a group, they were substantial buyers of California crude oil and their interest, therefore, lay in low posted prices.

Table 6 shows a breakdown of 1982 California crude production by company type. The four companies which post prices accounted for about 25 percent of production and the other PAD V majors added another 19 percent. Other Pad V refiners (excluding Getty) added another 8 percent so that, overall, a little over 50 percent of California crude oil was produced by refiners which presumably used the crude in their own systems. The remainder of the crude oil was produced by companies whose interest lay in maximizing crude prices since they were net sellers to California refiners. The largest of these companies is Getty whose 1983 deliveries are shown in Table 7. Most of Getty's crude oil is heavy crude oil and, like many California

TABLE 5

1982 CRUDE OIL PRODUCTION
VERSUS
OPERATING REFINERY CAPACITY (MBPD) AT 1/1/82

	PRODUCTION (MBPD)	CALIFORNIA CAPACITY (MBPD)	CALIFORNIA SELF-SUFFICIENCY (Percent)
POSTERS			
Arco	26.2	165.0	15.9
Chevron	150.8	710.0	21.2
Mobil	50.7	125.5	40.4
Union	47.0	197.5	23.8
Total	274.7	1198.0	22.9
OTHER PAD V MAJORS			
Shell	168.2	184.4	91.2
Texaco	40.0	75.0	53.3
Total	208.2	259.4	80.3
OTHER PAD V REFINERS			
Champlin	11.9	60.0	19.8
Conoco	11.0	35.8	30.7
Exxon	48.3	106.0	45.6
Getty	137.7	40.9	312.2
Gulf	14.3	51.5	27.8
Tosco	0.5	165.5	0.3
Total	223.7	459.7	48.7
GRAND TOTAL	706.6	1917.1	36.9

138
40
178

75
41
116

TABLE 6

1982 CRUDE OIL PRODUCTION BY TYPE OF COMPANY

	PRODUCTION (MBPD	SHARE (Percent)
POSTERS		
Arco	26.2	2.4
Chevron	150.8	13.7
Mobil	50.7	4.6
Union	47.0	4.3
Total	274.7	25.0
OTHER PAD V MAJORS		
Shell	168.2	15.3
Texaco	40.0	3.6
Total	208.2	18.9
OTHER PAD V REFINERS EX GETTY		
Champlin	11.9	1.1
Conoco	11.0	1.0
Exxon	48.3	4.4
Gulf	14.3	1.3
Tosco	0.5	.
Total	86.0	7.8
GETTY	137.7	12.5
NON PAD V REFINERS		
Crown Central	0.8	0.1
Husky	3.1	0.3
Marathon	2.9	0.3
Phillips	3.0	0.3
Sun	23.3	2.1
Tenneco	17.3	1.6
Total	50.4	4.6
OTHER MAJOR PRODUCERS	MBPD	
Aminoil	25.8	2.3
Berry Co.'s	5.1	0.5
Oxy	5.3	0.5
Petro-Lewis	9.5	0.9
Santa Fe Energy	33.5	3.0
Superior	6.8	0.6
Long Beach	68.8	6.3
U.S. Dept. of Energy	122.6	11.1
Total	277.4	25.2
ALL OTHER	65.4	5.9
GRAND TOTAL	1099.8	100.0

TABLE 7

ESTIMATED
1983 GETTY DELIVERIES

	MBPD
DELIVERIES	
Tosco	54
Own Use (Mohawk)	40
Chevron	10
Total	104
Oasis	20
Huntway	5
San Joaquin	2
Edgington	1
MacMillan	1
Crysen	2
Pilot	1.5
Powerine	3
Total	35.5
GRAND TOTAL	139.5
PRODUCTION	
Light	4.8
Heavy	136.5
Total	141.3

heavy crude producers, a significant part of Getty's crude is sold under long term contracts tied to posted prices. This type of contract is unusual in the rest of the U.S. but is common in California. Here, term relationships have been sought by producers to assure crude oil outlet and by refiners to insure the continuous supply needed to justify the costly investment in conversion processing required to achieve high yields of light products from heavy crudes.

Non-PAD V refiners contribute about 5 percent of total production. These companies may exchange California crudes for crudes elsewhere in the U.S. and may possibly net a price higher than the posting based on the exchange differential. The remaining 30 percent of production is accounted for by independent producers which have a clear cut interest in achieving as high a price as possible. Except for the Elk Hills production of the Department of Energy, we believe that this crude oil is predominantly sold at posted prices and that a significant part is sold under term contracts. The Department of Energy is unique among these independent producers. It produces a light crude oil (predominantly 34° API) whereas the other independents typically produce heavy crudes. More importantly, the DOE crude oil has direct access to gathering and common carrier transportation whereas the other independents depend on their refinery customers for gathering and transportation. As a consequence, the DOE was able to sell to independent refiners at a premium over postings although it too sold at postings from May 1982 to September 1983 when it did not hold an auction. Overall, throughout much of the period of interest (1980 through 1983) we believe over 40 percent of California crude oil was sold at posted prices between non-affiliated buyers.

Table 8 shows the company ownership pattern of California pipeline facilities. Union and Getty operate heated pipelines to the San Francisco area while Chevron relies on blending lighter crudes for viscosity control on its system to the Bay Area. Chevron also operates a heated pipeline to Estero Bay from which San Joaquin Valley

TABLE 8

COMPANY CONTROL OF CALIFORNIA PIPELINE FACILITIES

	CAPACITY (MBPD)	UTILIZATION (Percent)
SAN JOAQUIN VALLEY TO SAN FRANCISCO		
Chevron	90	
Getty	200	
Union	80	
Total	370	
Est. 1982 Throughput (MBPD)	270	73%
SAN JOAQUIN VALLEY TO COASTAL AREA		
Chevron	60	
Union	25	
Total	85	
Est. 1982 Throughput (MBPD)	82	96%
SAN JOAQUIN VALLEY TO LOS ANGELES		
Mobil	50	
Four Corners (ARCO)	90	
Total	140	
Est. 1982 Throughput (MBPD)	134	96%
VENTURA TO LOS ANGELES		
Shell	50	
Texaco	60	
Total	110	
Est. 1982 Throughput (MBPD)	89	81%

crude (and Coastal Area crudes) can be shipped by tanker to its refineries in Los Angeles and San Francisco. Except for Tosco, which has been largely supplied by Getty, there were no independent refiners in the Bay Area in 1982 which could have bid up the price of California crude oils. Furthermore, all the pipelines from the San Joaquin Valley to the Bay Area and Coastal Area operate as proprietary systems rather than as common carriers. Deliveries to the system are on the basis of purchase and sale arrangements or exchange agreements and thus access is limited.

The pipelines from Ventura (Coastal Area) to Los Angeles are also proprietary systems owned by Shell and Texaco. In addition, there are two pipelines from the San Joaquin Valley to Los Angeles. Mobil operates a proprietary heated pipeline while Arco operates the only common carrier pipeline, the Four Corners Pipeline. This pipeline system also extends from the Los Angeles area to the San Juan Basin where it connects with a pipeline to the Gulf Coast. The Four Corners Pipeline formerly delivered crude oil from the San Juan Basin to Los Angeles until it was acquired by Arco which reversed the flow. The pipelines from the San Joaquin Valley to Los Angeles have typically run full and marginal crude oil supplies have moved to California by truck (at a cost of about $2/barrel) and, more recently, by unit train (Shell). Thus, access by independent refiners to San Joaquin Valley crude oil production has been limited by pipeline constraints and, on the margin, the independents have resorted to high cost trucking for marginal supplies. This reduces their ability to pay much more than the going posting and still remain competitive.

The control over gathering systems by the PAD V majors also creates a formidable hurdle limiting the access of independent producers to a wider market. As shown in Table 9, in a sample of 148 fields the PAD V majors owned 293 out of a total of 316 gathering systems. To circumvent this control, independent producers and/or refiners would

TABLE 9

COMPANY CONTROL OVER GATHERING SYSTEMS
Number of Fields with Gathering Facilities

	LOS ANGELES AREA	SAN JOAQUIN VALLEY	COASTAL REGION	TOTAL
POSTERS				
Arco	11	11	11	33
Chevron	19	35	12	66
Mobil	12	22	10	44
Union	19	24	33	76
Total	61	92	66	219
OTHER PAD V MAJORS				
Shell	13	18	8	39
Texaco	8	17	10	35
Total	21	35	18	74
Total Pad V Majors	82	127	84	293
OTHERS				
Exxon	1		1	2
Conoco			1	1
Beacon		1		1
Golden Bear		4		4
Golden Eagle	2			2
Powerine	3			3
Edgington	2			2
Champlin	1			1
Aminoil	2			2
Tosco		1		1
Mohawk		3		3
U.S.Dept.of Energy		1		1
Total	11	10	2	23
GRAND TOTAL	93	137	86	316
NUMBER OF FIELDS IN SAMPLE	35	57	56	148

have to make use of costly truck transportation. In short, limited access to transportation and gathering, results in a less competitive crude market in California than would be the case if the pipelines and gathering systems were common carriers as is typical in the rest of the country.

In summary, we conclude that the structure of the California market and principally the control over gathering and pipeline transportation creates a less competitive market in California than is the case elsewhere in the country. The situation is exacerbated by the preponderance of heavy crude oil production which, on the one hand, requires that refiners have an inducement to install costly upgrading facilities and, on the other hand, creates an interest among independent producers to sign long term contracts linked to posted prices to insure outlets. Low heavy crude oil prices, in turn, tend to drag down the prices of lighter crude oils even though California gravity differentials (price versus API gravity) are the highest in the country. As a result, during this period California refiners were able to acquire local crude oils at prices below those which would have been determined by their value at refineries as set by marginal crude oil supplies to the West Coast market, i.e., by ANS or imports.

This, however, in our view does not invalidate California posted prices as a basis for taxes and royalties. A substantial volume of crude oil comprising at least a third of production, and generally more, was sold between unrelated parties at these posted prices. Thus, although these posted prices should not be used, as Arco has contended, to construct a West Cost price for ANS for which there was a well-known and widely publicized price, we believe they are a valid prices for California crude oils. The apparently low California postings are a reflection of a market structure in which refiners were able to capture economic rent from their proprietary pipeline operations because marginal buyers and sellers were forced to use high

cost alternate transportation. We therefore believe that posted prices are a proper basis to calculate windfall profit taxes except where it can be shown that a company gained a price benefit by exchanging its California crude oil production (or a portion thereof) for crude oils outside the West Coast market. This may have been the case for some PAD V crude oil producers which have refineries in other parts of the country.